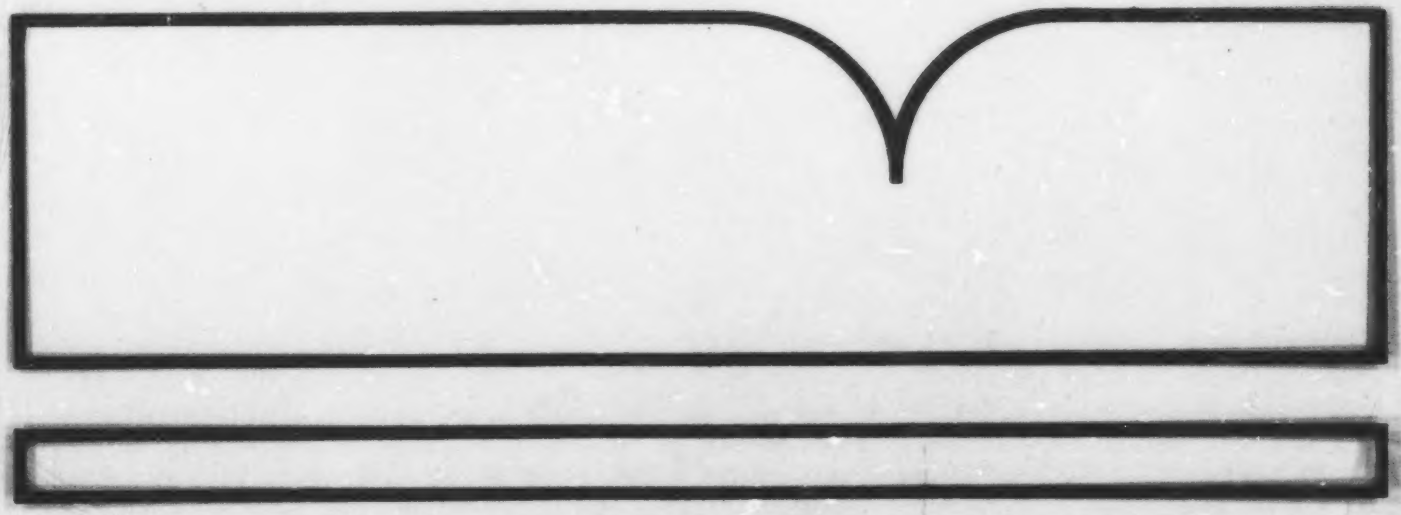
PB85-213809

Superfund Record of Decision (EPA Region 3)
Enterprise Avenue Site
Philadelphia, Pennsylvania, May 1984

(U.S.) Environmental Protection Agency
Washington, DC

10 May 84



U.S. Department of Commerce
National Technical Information Service

United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R03-84/003
May 1984

PB85-213809

EPA

Superfund Record of Decision:

Enterprise Avenue Site, PA

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SPRINGFIELD, VA. 22161

TECHNICAL REPORT DATA
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4. TITLE AND SUBTITLE SUPERFUND RECORD OF DECISION: Enterprise Avenue Site, PA	5. REPORT DATE 05/10/84
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15. SUPPLEMENTARY NOTES	

16. ABSTRACT

The Enterprise Avenue site is located within the City of Philadelphia. It encompasses approximately 57 acres and is situated within the 100-year flood plain of the Delaware River. It has been determined that the site is contaminated with industrial and chemical wastes from the unauthorized disposal of approximately 5,000 to 15,000 drums containing paint sludges, solvents, oils, resins, metal finishing wastes, and solid inorganic wastes.

The off-site disposal alternative was selected as the most cost-effective remedial action. This alternative includes: resampling and analyzing the stock-piled soils in 100-cubic-yard lots for key indicator parameters; on-site containment of soils which do not exceed key indicator limits; off-site disposal at a RCRA approved facility of soils which exceed parameter limits; grading, completion of clay cap and cover, and site vegetation. The capital cost for the selected alternative is estimated to be $4,324,000 and annual O&M costs are $4,200.

Key Words: Municipally-Owned Site, Potential Responsible Party (PRP), Key Indicator Analysis, Soil Contamination, RCRA Closure Regulations, Off-Site Disposal, On-Site Disposal

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision Site Name: Enterprise Avenue Site, PA Contaminated media: sw, soil Key contaminants: paint sludges, solvents oils, resins, metals		

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS *(This Report)* None	21. NO. OF PAGES 30
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ROD BRIEFING ISSUES

Site: Enterprise Avenue, Pennsylvania

Region: III

AA, OSWER
Briefing Date: May 4, 1984

SITE DESCRIPTION

The Enterprise Avenue site is located within the City of Philadelphia. It encompasses approximately 57 acres and is situated within the 100-year flood plain of the Delaware River. It has been determined that the site is contaminated with industrial and chemical wastes from the unauthorized disposal of approximately 5,000 to 15,000 drums containing paint sludges, solvents, oils, resins, metal finishing wastes, and solid inorganic wastes.

SELECTED ALTERNATIVE

The off-site disposal alternative was selected as the most cost-effective remedial action. This alternative includes: resampling and analyzing the stockpiled soils in 100-cubic-yard lots for key indicator parameters; on-site containment of soils which do not exceed key indicator limits; off-site disposal at a RCRA approved facility of soils which exceed parameter limits; grading, completion of clay cap and cover, and site vegetation. The capital cost for the selected alternative is estimated to be $4,324,000 and annual O&M costs are $4,200.

ISSUES AND RESOLUTIONS

1. The Enterprise Avenue site is a city-owned landfill contaminated with illegally dumped industrial waste materials. The City has undertaken response actions at the site and would like to continue to oversee the remaining cleanup activities. However, the City has been identified as a Potential Responsible Party (PRP). Therefore, specific criteria were developed for the Cooperative Agreement to define the rationale for enforcement where Fund monies will be used by a PRP for cleanup. These criteria included:

    - EPA's reserved right to sue
    - Reimbursement agreement between the City and EPA

KEY WORDS

- Municipally-Owned Site
- Potential Responsible Party (PRP)

ISSUES AND RESOLUTIONS	KEY WORDS
. The City's responsibility to continue to pursue its pending lawsuits against Enterprise Avenue generators.	
. A Key Indicator Analysis (KIA) was developed and used to determine whether or not excavated soil was contaminated. The objective of the KIA was to identify those contaminants which were most likely to be found on-site and of greatest concern with respect to potential environmental impacts. Technical Report #5 "Hot Spot Soil Handling Protocol" discusses the rationale employed in the KIA development and is included as an attachment to the ROD.	. Key Indicator Analysis . Soil Contamination
3. The recommended alternative complies with the Part 265 RCRA closure regulations. This includes ground water monitoring, a 2-foot clay cover and site vegetation.	. RCRA Closure Regulations
4. The justification for off-site disposal was based on the elimination of on-site disposal options for the following technical reasons: 1. The high ground water table and subsurface soils are not suitable for construction of a land disposal facility. 2. There is a high possibility for differential settlement due to the presence of organic matter in the subsurface soils (incinerator residue), that could adversely affect the integrity of a land disposal cell. 3. Migration to the shallow ground water table (2-5 ft.) could be expected in the event of a release of contaminants from a disposal cell.	. Off-Site Disposal . On-Site Disposal

Record of Decision
Remedial Alternative Selection

SITE: Enterprise Avenue Site, Philadelphia, Pennsylvania

DOCUMENTS REVIEWED

I have reviewed the following documents describing the analysis of cost-effectiveness of remedial alternatives for the Enterprise Avenue site:

- Enterprise Avenue Remedial Action Feasibility Study titled "Remedial Action Program, Excavation and Disposal of Hot-Spot Soil From, and Closure of, the Enterprise Avenue Site, Philadelphia, Pennsylvania, dated April 1984.

- Summary of Remedial Alternatives Selection

- Technical reports prepared by Roy F. Weston, Inc. in September of 1981 for the City of Philadelphia #5, "Hot Spot Soil Handling Protocol" and #3, "Groundwater and Surface Water Monitoring".

- Responsiveness summary dated February 23, 1984.

DESCRIPTION OF SELECTED REMEDY

- Sampling and analysis of all soil stockpiled on-site in 100-cubic-yard lots to determine disposal requirement.

- Off-site disposal at a RCRA approved facility of all soils which fail the Key Indicator Parameter Test.

- Backfilling, grading and vegetating of the site as a final cover.

DECLARATIONS

Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), and the National Contingency Plan (40 CFR Part 300), I have determined that the off-site disposal of contaminated soil at the Enterprise Avenue site is a cost-effective remedy and provides adequate protection of public health, welfare, and the environment. The State of Pennsylvania has been consulted and agrees with the approved remedy.

I have also determined that the action being taken is appropriate when balanced against the availability of Trust Fund monies for use at other sites. In addition, the off-site transport and secure disposition in an approved facility is more cost-effective than other remedial actions and is necessary to protect public health, welfare, and the environment.

5/10/84
Date

Lee M. Thomas
Assistant Administrator
Office of Solid Waste and Emergency Response

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION
ENTERPRISE AVENUE SITE

SITE LOCATION AND DESCRIPTION

The Enterprise Avenue site is located within the City of Philadelphia adjacent to the Southwest Water Pollution Control Plant and near the eastern end of Philadelphia International Airport (See Figure 1). The city-owned site encompasses a total of approximately 57 acres, and is located within the 100-year flood plain of the Delaware River. The immediately adjacent land use is primarily industrial, and the closest residential population is located slightly more than two miles northwest of the site.

Natural marsh conditions are found at the site in isolated areas. A low-permeability, silty clay layer underlies the site. The thickness of this layer ranges from 5 feet to 25 feet. Multiple culverts, canals, and drainage ways introduce variability to the surface water system by concentrating runoff. All surface drainage from the site is channeled into Eagle Creek, which flows to Mingo Creek, then to the Schuylkill River, and ultimately the Delaware River.

There are two ground water-bearing zones at the site. The first zone is above a silty clay layer. It is under perched water table conditions. The second ground water-bearing zone is found in the sands and gravel that lie beneath the silty clay. The ground water in this zone is under confined conditions. There are no known users of the ground water in the general area; however, the deeper ground water-bearing zone may recharge sources of ground water for portions of southern New Jersey. The observed flow in the deep aquifer is east toward the Delaware River.

SITE HISTORY

The Enterprise Avenue site historically was part of the extensive tidal marshland along the Delaware River. The back channel of the Delaware River had naturally silted-in because of extensive farming and mining on the upper reaches of the Schuylkill and Delaware Rivers. The low-lying land in the area has been extensively filled-in for facilities such as the airport, tanker terminals, roadways, and industrial sites. Until mid-1976, the City of Philadelphia Streets Department used 40 acres of the low-lying land to landfill primarily incinerator residue and lesser quantities of fly ash and construction/demolition debris.

In response to reports of unauthorized dumping of industrial waste, the Philadelphia Water Department (PWD) in late 1978 developed a work scope to perform an initial investigation of the site conditions in consultation with EPA. Exploratory excavations during January of 1979 uncovered approximately 1,700 55-gallon drums containing industrial waste materials. The

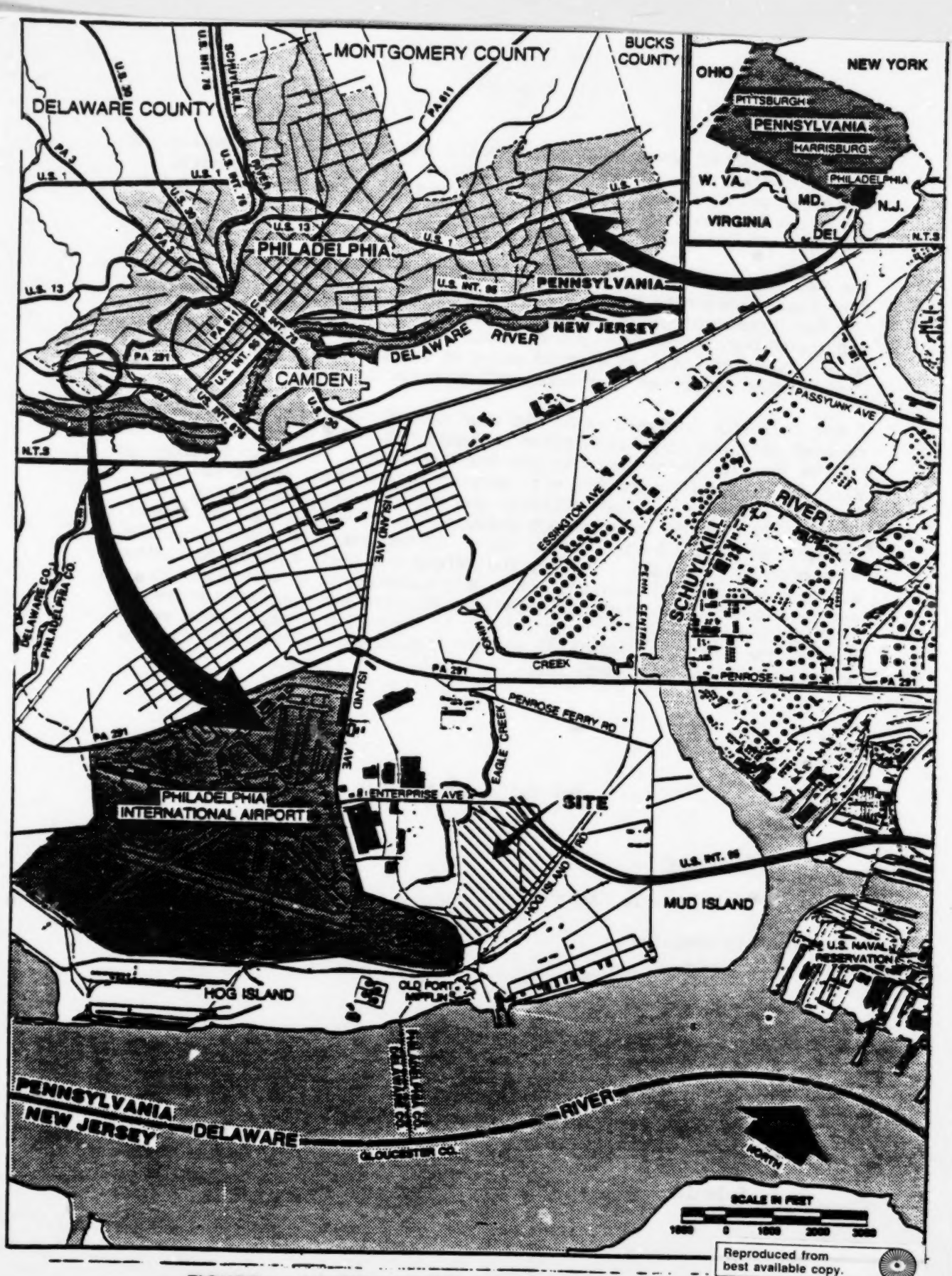

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FIGURE 1 LOCATION OF THE ENTERPRISE AVENUE SITE

great majority of these drums were broken and fragmented. Generally, it was determined that the drums contained such industrial and chemical wastes as paint sludges, solvents, oils, resins, metal finishing wastes, and solid inorganic wastes. The total number of drums disposed of at the site was estimated by the PWD to be between 5,000 and 15,000.

The PWD undertook a response action at the site which included: A detailed site investigation to determine the degree and extent of contamination; the development of plans and specifications to accomplish site cleanup; and procurement of a cleanup contractor to excavate and properly dispose of contaminated soil and drummed waste at an approved off-site facility. Contaminated water was also taken off-site for disposal.

A Key Indicator Analysis (KIA) was used to determine whether or not excavated soil was to be considered contaminated. The objective of the KIA was to identify those contaminants which were most likely to be found on-site and of greatest concern with respect to potential environmental impacts. The list of key indicator contaminants was developed by reviewing the records in existence which pertained to the type and quantity of waste materials buried at the site. In general, the waste materials were organic in nature. The key indicators and their associated limits are listed below. If any one limit were exceeded in an analysis, the entire batch of soil was considered contaminated and was taken off-site for disposal at an approved landfill. If none of the limits were exceeded, the soil was classified as noncontaminated and remained on-site to be used as backfill material.

Key Indicator Analysis

Indicator	Limit
1. TOX (Total Organic Halogen)	25 ppm
2. Volatile Organics	
- Benzene	12 ppm
- Toluene	15 ppm
- Ethylbenzene	15 ppm
3. EP Toxicity (Metals)	
- Arsenic	5 ppm
- Barium	100 ppm
- Cadmium	1 ppm
- Chromium	5 ppm
- Lead	5 ppm
- Mercury	0.2 ppm
- Selenium	1 ppm
- Silver	5 ppm

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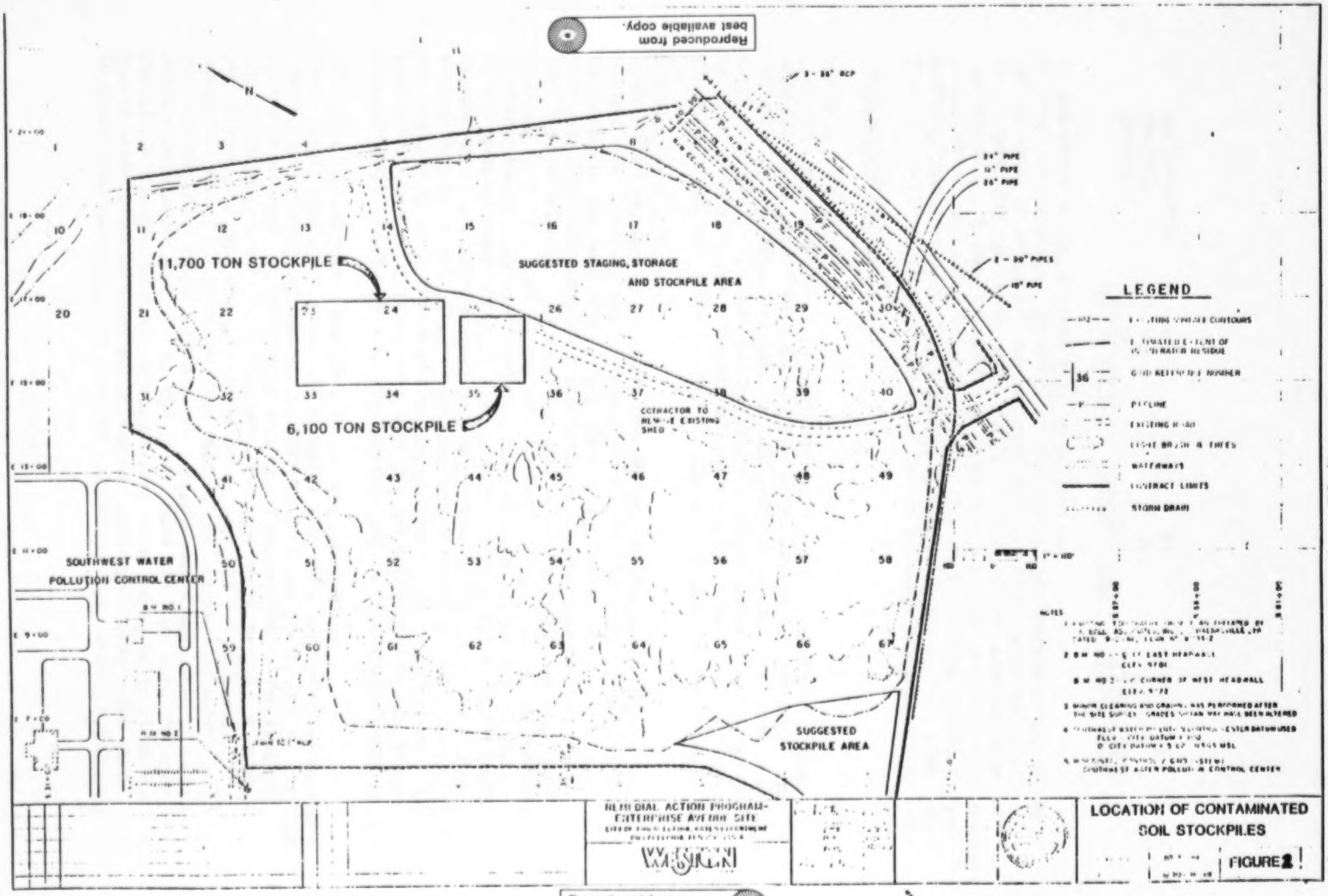

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In developing the limits for the key indicators, the maximum background levels present for the various parameters were identified. The upper limits for the key organic indicators were established at 75 times the maximum background levels. As the limits were set they were compared to the maximum fresh water criteria for reasonableness and found to be comparable. The EP toxicity test was applied for analysis of metals only, due to the fact that the TOX indicator will detect the presence of pesticides/herbicides. The approach taken for establishing the organic limits (i.e., 75x) is consistent with EPA's methodology which uses 100 times drinking water standards for establishing the limits for EP toxicity under RCRA. Technical Report #5 entitled "Hot Spot Soil Handling Protocol" discusses the rationale employed in the KIA development.

Unfortunately, in the Fall of 1982 the PWD had to halt cleanup work at the site due to a lack of funds available for the completion of the project. The remedial project contract cost had reached $7.2M at that time. The initial bid price was $4.95M. The work accomplished during 1982 included: excavation of all contaminated soil and buried drums; off-site disposal of all drummed waste material (11,600 drums uncovered); off-site disposal of approximately 226,000 gallons of contaminated water; and off-site disposal of 21,350 tons of the approximately 39,150 tons of contaminated soil present on-site. When the PWD realized that the funds available were inadequate to complete the project, they directed the contractor to stockpile the remaining 17,800 tons of excavated contaminated soil on-site (see Figure 2 for location of piles). The City of Philadelphia spent more than $8.35M for site cleanup and related investigative and engineering activities.

All cleanup actions taken to date at the site by the PWD were done with the concurrence of EPA. The Agency was intimately involved, both technically and legally, in the development and implementation phases of the cleanup. All proposed actions were reviewed to assure that they complied with Federal environmental regulations which existed at the time. The City was most cooperative in modifying it's plans in response to the Agency's comments.

CURRENT SITE STATUS

The two stockpiles of soil remaining on the site are the subjects of the proposed remedial action. The larger of the two piles (11,700 tons) was determined to be contaminated primarily with Total Organic Halogens (TOX). The median TOX concentration of the soil in this pile is 65 ppm, the average is 350 ppm, and the range is 29 ppm to 5,350 ppm. The smaller pile (6,100 tons) is primarily contaminated with Volatile Organics (i.e. Benzene, Ethylbenzene, Toluene). A summary of the concentration values of the soils in the smaller pile is as follows:

	Median (ppm)	Average (ppm)	Range (ppm)
Toluene	36	172	19 to 1,000
Benzene	24	34	17 to 86
Ethylbenzene	41	94	18 to 427

Each stockpile has been graded and covered with 9 to 12 inches of clay. The determination as to which soil would be stockpiled was based upon analytical results produced by the cleanup contractor in the Fall of 1982. (See Appendix A for results.)

Subsequent sampling and analysis of soil from the stockpiles performed by Roy F. Weston, Inc. in March of 1983 and March of 1984 yield results which, when compared to the original analytical results of the cleanup contractor, raise questions as to the level of contamination in the piles. The Weston results are generally lower than the contractor's. (See Appendix B for Weston's analytical results.) This could be due to volatilization/biodegradation of some contaminants. Also, it could be the result of non-representative sampling of the piles. In any event, re-verification of the degree of contamination in the soil must be done prior to final disposition.

Contamination at the site is limited to the confines of the two stockpiles. Ground water and surface water samples taken each month at the site continue to indicate no measurable impact from the site on the surrounding environment.

A silty clay layer from 5 to 25 feet in thickness, which underlies the site, generally restricts movement of the surface water and shallow ground water into the deep water-bearing zone. As a result, most precipitation infiltrating the ground at the site drains to adjacent surface streams via discharge of the shallow (perched) water-bearing zone rather than moving downward into the deep water-bearing zone. However, the potential exists for contamination from the stockpiled soil to leach into the deep water aquifer, and for volatile compounds to find their way into the various surface streams in the area.

ENFORCEMENT

EPA has sent the City a letter stating that the agency does not plan to initiate any court actions concerning Enterprise Avenue so long as the City continues to pursue it's pending lawsuit against Enterprise Avenue generators, and returns half of the recovered monies to the Superfund until the Superfund expenses are fully repaid. EPA is not involved in any litigation or negotiations concerning generators or transporters linked to the Enterprise site. The City's Philadelphia v. Stepan case was filed against more than 80 generators in 1980. The City has also brought suit against transporters linked to the site.

ALTERNATIVES EVALUATION

The remaining cleanup action to be undertaken at the site will address the stockpiled soil. The objective of the cleanup is to provide adequate protection of public health, welfare, and the environment. The alternatives for cleanup action considered include:

- Soil Aeration
- Land Treatment
- Composting

- On-Site Encapsulation
- Off-Site Disposal
- No Action

Since the origins of the hazardous substances discovered at the site could not be determined conclusively, it was assumed that the stockpiled soil is regulated by RCRA for handling and disposal purposes. All alternatives evaluated (except No Action) were designed to comply with RCRA technical and administrative requirements.

The Remedial Action strategy may be an individual alternative, or a combination of the alternatives evaluated. Each of the alternatives has been evaluated with respect to: technical advantages, disadvantages, and limitations; cost; environmental factors; implementability; and institutional and regulatory considerations.

The on-site encapsulation, on-site treatment, and off-site disposal options were analyzed in detail. The No Action alternative was eliminated from evaluation during the screening process. This was due to the fact that the existing piles were a means of temporary storage, and they do not comply with technical requirements of RCRA (i.e., no synthetic liner, no leachate collection system). This is in addition to the potential contamination to ground and surface waters from the stockpiles.

The On-Site Encapsulation alternative involves the construction of a cell on-site for the permanent containment of the stockpiled soil materials. The design of such a system would comply with the technical requirements of RCRA, which in this case would include protection from a 100-year flood occurrance, placement of monitoring wells around the cell, and a proper liner and capping system. Several technical disadvantages of this alternative are:

1. Although construction of an on-site disposal facility would be in compliance with appropriate RCRA regulations, the high ground water table and subsurface soils are generally not suitable for construction of a land disposal facility.

   This also is consistant with Pennsylvania regulations, which require that a separation of at least four feet be maintained between the seasonal high elevation of the shallow (perched) water table and the base of the encapsulation cell.

2. The on-site material (incinerator residue) upon which the cell will be placed contains organic matter and is difficult to compact. The possibility exists for differencial settlement to occur which may adversely affect the integrity of the cell and allow for the release of the contained material.

3. The depth to ground water at the site has been measured to be as little as 2 - 5 feet below the surface. In the event of a release of contaminated material from the cell, migration of contaminants to the shallow ground water table could be expected.

Besides these factors, the Pennsylvania Department of Environmental Resources prohibits the placement of encapsulation cells within the 100-year flood plain, regardless of the flood protection provisions made.

The other alternatives evaluated all require verification sampling and analysis of the stockpiled soil to determine whether or not it presently exceeds the key indicator parameters established for this project. The most recent analytical results indicate that approximately 25% of the samples taken from the piles fail the KIA. However, the samples were drawn from the upper layers of the piles. Degree of contamination of the soil at greater depths is unknown. For the purposes of developing cost estimates for the alternatives which include off-site disposal of soil, it was assumed that 50% of the soil in the stockpiles is currently contaminated (i.e., will fail the KIA test). This percentage was derived using the latest analytical results, and includes a 25% contingency due to the uncertainty associated with the degree of contamination of the soil in the inner portions of the piles. The remaining 50% of the soil was assumed to be noncontaminated and suitable for use as backfill on-site.

The on-site treatment alternatives (Land Treatment, Composting, and Soil Aeration) are all source control measures which call for treatment of the soil which exceeds the key indicator limits with the goal of reducing the degree of contamination through aeration and biodegradation. After a batch of soil receives treatment, it would be tested and, if it still exceeds the parameters, it would be taken off-site for disposal at an approved landfill.

In the Soil Aeration alternative, treatment of the soils would be accomplished by using mechanical equipment to agitate, mix, and aerate the soils. Some technical uncertainties are associated with this operation since mechanical aeration of soils has not been extensively used in the past. The moisture content and consistency of the soils would need to be controlled to insure that the soils can be physically mixed and will not jam or plug the equipment. In addition, the residence time and agitation required to achieve an acceptable level of devolatilization is not known.

In the Composting alternative, biological treatment of the soil would be employed to achieve contamination reduction. Even though composting has proved successful for municipal sewage sludge, its application to contaminated soils has not been proved. There are also technical uncertainties regarding the microorganisms and nutrient seed material to be used, and the degree of success which can be expected from the process.

The Land Treatment alternative involves spreading and cultivating of the contaminated soils. Cultivation would be performed using agricultural equipment such as disc harrows, rakes, or plows. Contamination reduction could be achieved by volatilization and biodegradation. Although land treatment has been used successfully for many years in the petroleum refining industry, the rate or levels of treatment that can be achieved for the waste contained in the stockpiled soil is unknown. As stated

earlier, the ground water level at this site has been measured to be as little as 2 - 5 feet below the surface. If the land treatment technique were implemented and reduction of the hazardous waste were not achieved, the migration of the contaminants to the shallow ground water table could result.

The Off-Site Disposal alternative would require that any soil which failed the KIA test be taken to an approved, permitted facility for ultimate disposal of the contaminated soil. The soils would be excavated from the stockpiles in lots of 100 cubic yards. The sampling protocol will provide for a variable sampling frequency per soil lot to ensure a high degree of sampling sensitivity. Any soil lots that do not exceed the key indicator limits will be backfilled on-site in area's having no planning future development. The site will be covered with an impermeable clay cap to prevent potential leaching of any residual contamination into the ground water. The material taken off-site for disposal would be manifested in accordance with RCRA. There are no technical uncertainties associated with this alternative. Standard construction, excavation, and earth moving equipment and techniques will be employed. Existing permitted hazardous waste facilities will be allowed to accept the waste from this site. In fact, this was the alternative implemented for the previous cleanup effort at this site. The environmental concerns associated with this alternative are minimal. This alternative provides the additional benefit of preserving the planned use of this site for a waste treatment facility.

The cost of the various alternatives range from $3.0M to $5.3M, excluding the No Action alternative. The following is a tabulation of the cost estimates for the alternatives.

Cost Summary for Remedial Actions

	Alternative	Estimated Capital Construction Cost	Estimated Post Closure Cost*
1.	Soil Aeration	$4,595,000	$ 66,000
2.	Land Treatment	4,238,000	66,000
3.	Composting	5,297,000	66,000
4.	On-Site Encapsulation	3,006,000	154,000
5.	No Action	- 0 -	154,000
6.	Off-Site Disposal	4,324,000	49,000

*Present worth computed over 30 years at a 7 3/8% discount rate.

COMMUNITY RELATIONS

The Draft Feasibility study was made available for public comment. Copies of the document were placed in repositories in the vicinity of the site. A notice was placed in the local newspaper regarding the availability of the Feasibility Study for public review, and to announce that a public meeting was scheduled for February 23, 1984. The meeting was held at the City of Philadelphia's Southwest Water Pollution Control Plant, and was attended by representatives of EPA, the Pennsylvania Department of Environmental Resources, the City of Philadelphia Water Department, and several citizen/ environmental action groups.

Basically, the comments received from the public expressed their displeasure with the lack of detailed information in the Feasibility Study, and indicated a strong preference for implementing the alternative requiring off-site disposal of all soil determined to be contaminated. They were adamantly opposed to implementation of any of the alternatives calling for on-site containment or treatment of contaminated soil. The public comment period closed three weeks after the study was made public.

In response to the public comments received, extensive revisions were made to the Feasibility Study, greatly increasing the degree of detail and supporting documentation for the alternatives considered for cleanup.

CONSISTENCY WITH OTHER ENVIRONMENTAL LAWS

All of the alternatives evaluated (except No Action) were formulated to be in compliance with RCRA land treatment, storage, and disposal technical and administrative requirements whenever possible. Included were the physical controls necessary (i.e., monitoring wells, leachate collection systems, liners, etc.) to implement the on-site treatment and disposal alternatives. The cost estimates developed for the alternatives took into account the RCRA technical and administrative requirements which apply to the individual remedial actions. The recommended alternate of off site disposal provides a beneficial effect on the 100 year flood plain.

RECOMMENDED ALTERNATIVE

Section 300.68 (j) of the National Contingency Plan (NCP) [47 FR 31180, July 16, 1982] states that the appropriate extent of remedy shall be determined by the lead agency's selection of the remedial alternative which the agency determines is cost-effective (i.e., the lowest cost alternative that is technologically feasible and reliable) and which effectively mitigates and minimizes damage to and provides adequate protection of public health, welfare, and the environment. Based on our evaluation of the cost-effectiveness of each of the proposed alternatives, the comments received from the public, informations from the Feasibility Study, and information from the City of Philadelphia, we recommend that the Off-Site Disposal alternative be implemented. This alternative includes: Resampling and analysis of the stockpiled soils in 100-cubic-yard lots for the key indicator parameters; on-site containment of soils which do not exceed established parameter limits; off-site disposal at RCRA approved facility of soils which exceed established parameter limits; grading, completion of clay cap and cover, and vegetating of the site.

The recommended alternative is the least cost alternative that is technically feasible and reliable, and which effectively mitigates and minimizes damage to and provides adequate protection of public health, welfare, and the environment. It also complies with RCRA by calling for off-site disposal of contaminated soil at a RCRA approved facility, and the level of cleanup was determined in a manner consistent with the RCRA methodology. In comparison, the alternatives evaluated calling for on-site treatment of contaminated soil by composting and aeration are more costly, and the reliability of the processes associated with treatment of the waste present in the soil on-site is uncertain; the Land Treatment alternative, although less costly than off-site disposal, has technical uncertainties associated with it, and failure to achieve the desired contaminant reductions could result in migration of hazardous substances to the shallow ground water table; the On-Site Encapsulation alternative is less capital cost intense, however, it will require a longer term O & M period at a much higher cost than the recommended alternative, is not as technically reliable as the Off-Site Disposal alternative, and the high ground water table and fill material at the Enterprise Avenue site are generally not suitable for construction of an on-site disposal facility so long as there is another viable cost-effective alternative for disposal. Although the on-site cell would be designed to guard against releases, the hydrogeologic conditions at the site (i.e., high ground water table, located within the 100-year flood plain) would multiply the adverse effects of any failure of the cell which may occur.

The capital cost for the recommended alternative is estimated to be $4,324,000. The monitoring and maintenance costs are estimated to be $49,000 (present worth value) for a period of thirty years. A breakdown of the capital costs appear in Appendix C.

OPERATION AND MAINTENANCE (O & M)

The O & M activities associated with the recommended alternative are inspection of the site (1 crew-day/year) and maintenance of the vegetated cover (5 crew-days/year) at an annual cost of approximately $4,200. The City of Philadelphia will assume full responsibility for O & M since it is a city-owned property.

PROPOSED ACTION

We request your approval of the removal of all soil from the Enterprise Avenue site which fails the established Key Indicator Parameter test. This action will complete the cleanup of this hazardous waste disposal site. The estimated total cost for this state-lead project is $4.82M, which includes the cost for construction management. We also request an allocation of $2.41M from the Superfund to fund this cleanup at the 50% level since it is a municipally owned site.

PROJECT SCHEDULE

- Approve Record of Decision	May 1984
- Award Cooperative Agreement for Construction	May 1984
- Start Construction	July 1984
- Complete Construction	November 1984

APPENDIX A

Summary of Analytical Results of Soil in the TOX Stockpile

Sample No.	Results	Sample No.	Results
S-0059	51	S-0243	82
S-0167	110	S-0246	150
S-0169	330	S-0247	259
S-0170	61	S-0248	5,350
S-0192	51	S-0250	148
S-0201	39	S-0284	135
S-0207	49	S-0295	39
S-0208	83	S-0296	65
S-0209	59	S-0300	29
S-0227	59	S-0302	1,921
S-0228	100	S-0303	213
S-0236	98	S-0304	78
S-0239	51	S-0306	29
S-0241	38		
S-0242	42		

Note

All results measured in parts per million.

Summary of Analytical Results of Soil in the Volatile Organic Stockpile

Sample No.	Benzene	Ethylbenzene	Toluene
S-0179		27	364
S-0180			24
S-0181		90	157
S-0183	28		22
S-0184			27
S-0188	17	24	35
S-0189			27
S-0193	19		
S-0217		93	30
S-0218		158	53
S-0219		41	
S-0249	86	47	330
S-0283			1,000
S-0287			25
S-0288		36	
S-0297		22	
S-0298		18	283
S-0305	18	49	36
S-0307	18	427	438
S-0309	43	33	54
S-0312	42		22
S-0313		42	
S-0315			19

Note

All results measured in parts per million.

APPENDIX B

Analytical Information on TOX Pile - March 1983

Quadrant	TOX ppm	Toluene ppm	Benzene ppm	Ethylbenzene ppm
A	0.52	0.58	0.25	0.13
B	0.17	1.10	0.26	0.24
C	0.56	1.10	0.63	0.42
D	0.42	7.80	2.00	1.30

	EP Toxicity - Metals (ppm)							
Quadrant	As	Ba	Cd	Cr	Pb	Hg	Se	Ag
A	NF	0.32	NF	NF	NF	<0.001	NF	NF
B	NF	0.16	NF	NF	NF	<0.001	NF	NF
C	NF	0.20	NF	NF	NF	<0.001	0.012	NF
D	NF	0.09	NF	NF	NF	<0.001	0.011	NF

Composite of Quadrants (ppm unless noted otherwise)

Fl	- 6.7	CN (T)	- 1.11	Cu (T)	-	462
NH_3-N	- 4.9	Ag (T)	- NF	Fe (T)	-	45,600
NO_3-N	- 13.7	Zn (T)	- 1054	Pb (T)	-	960
pH	- 7.8 pH units	As (T)	- 35	Hg (T)	-	0.7
VOC	- <3	Ba (T)	- 208	Se (T)	-	2.0
SPCD	- 1300 mmho	Cd (T)	- 12	Ti (T)	-	21
TOC	- 83	Cr^{+3} (T)	- 5.01	Cr^{+6} (T)	-	<4.0

NF = Not Found
T = Total Metals

Analytical Information on Volatile Organic Pile - March 1983

Quadrant	Tox ppm	Toluene ppm	Benzene ppm	Ethylbenzene ppm
A	0.24	0.50	1.20	0.53
B	0.26	1.60	4.00	0.69
C	0.08	1.00	0.17	0.20
D	0.47	1.40	0.84	0.50

	EP Toxicity - Metals (ppm)							
Quadrant	As	Ba	Cd	Cr	Pb	Hg	Se	Ag
A	NF	0.30	NF	NF	NF	<0.001	0.012	NF
B	0.01	0.13	NF	NF	NF	<0.001	0.013	NF
C	NF	0.14	NF	NF	NF	<0.001	0.013	NF
D	NF	0.10	NF	NF	NF	<0.001	0.012	NF

Composite of Quadrants (ppm unless noted otherwise)

Fl	- 9.1	CN (T)	-	1.55	Cu (T)	-	344
NH_3-N	- 3.9	Ag (T)	-	NF	Fe (T)	-	42,405
NO_3-N	- 259	Zn (T)	-	1166	Pb (T)	-	954
pH	- 7.9 pH units	As (T)	-	8	Hg (T)	-	0.85
VOC	- <3	Ba (T)	-	226	Se (T)	-	2.0
SPCD	- 820 mmho	Cd (T)	-	11	Ti (T)	-	39
TOC	- 122	Cr^{+3} (T)	-	69	CR^{+6} (T)	-	<4.0

NF = Not Found
T = Total Metals

ANALYTICAL INFORMATION ON TOX PILE - MARCH 1984

Sample No.	Quadrant	TOX ppm	Toluene ppm	Benzene ppm	Ethylbenzene ppm
A-1	A	570	<5.0	<5.0	<5.0
A-1 (duplicate)	A				
A-2	C	1,150	<5.0	<5.0	<5.0
A-3	C				
A-4	D				
A-4 (duplicate)	D				
A-5	D	2,860	<5.0	<5.0	<5.0
A-5 (duplicate)	D				
A-6	B	1,660	<5.0	<5.0	<5.0
A-6 (duplicate)	B				
A-7	B				
A-8	A	47	<0.001	0.0059	<0.001
Field blank (distilled water)	-				

ANALYTICAL INFORMATION ON VOLATILE ORGANIC PILE - MARCH 1984

Sample No.	Quadrant	TOX ppm	Toluene ppm	Benzene ppm	Ethylbenzene ppm
B-1	A				
B-2	C	530	<5.0	<5.0	<5.0
B-2 (duplicate)	C	490	39	52	<5.0
B-3	C				
B-4	D				
B-4 (duplicate)	D	460	7.9	<5.0	<5.0
B-5	D				
B-5 (duplicate)	D				
B-6	B				
B-7	B				
B-8	A				
B-8 (duplicate)	A	2,320	54	5.8	59
Field Blank (soil)	-				

ADDITIONAL ANALYTICAL INFORMATION ON TOX AND VOLATILE ORGANIC PILES - MARCH 1984

Sample No.	Pile	Quadrant	TOX ppm	Toluene ppm	Benzene ppm	Ethylbenzene ppm
A-1	TOX	A		<1.0	<1.0	<1.0
A-2	TOX	C		14	2.2	3.4
A-4	TOX	D		10	12	23
A-4 (duplicate)	TOX	D		23	7.6	59
A-5	TOX	D		3.0	1.5	5.9
A-6	TOX	B		53	1.1	2.3
A-6 (duplicate)	TOX	B		34	<1.0	<1.0
A-8	TOX	A		1.2	<1.0	<1.0
B-1	Vol	A		1.5	5.8	1.1
B-3	Vol	C		<1.0	<1.0	<1.0
B-4	Vol	D		1.2	1.4	<1.0
B-5	Vol	D		5.0	14	7.6
B-5 (duplicate)	Vol	D		7.7	25	6.0
B-6	Vol	B		9.0	28	1.3
B-7	Vol	B		2.4	2.9	4.9
B-8	Vol	A		1.4	<1.0	6.2
Field Blank (soil)	-	-		<1.0	<1.0	<1.0

TABLE 4

ANALYTICAL INFORMATION ON VOLATILE ORGANIC PILE - MARCH 1984

Sample No.	Quadrant	TOX ppm	Toluene ppm	Benzene ppm	Ethylbenzene ppm
B-1	A				
B-2	C	530	<5.0	<5.0	<5.0
B-2 (duplicate)	C	490	39	52	<5.0
B-3	C				
B-4	D				
B-4 (duplicate)	D	460	7.9	<5.0	<5.0
B-5	D				
B-5 (duplicate)	D				
B-6	B				
B-7	B				
B-8	A				
B-8 (duplicate)	A	2,320	54	5.8	59
Field Blank (soil)	-				

APPENDIX C

Construction Cost Estimate
Off-Site Disposal
(Alternative 6)

	Description	Quantity	Unit Cost	Total Cost
1.	Flood controls	1800 cu.yd.	$10/cu.yd	$ 18,000
2.	Excavate material from stockpiles and transfer on-site	18,000 tons	$4/ton	$ 72,000
3.	Segregate construction rubble	15 crew days	$1,000/ crew day	$ 15,000
4.	Analyze samples for key indicators	200 samples	$200 ea.	$ 40,000
5.	Backfill acceptable material and rough grade	9,000 tons	$2/ton	$ 18,000
6.	Dispose of contaminated material at an approved off-site facility	9,000 tons	$150/ton	$1,350,000
7.	Bury debris/rubble on-site	500 cy	$2/cy	$ 1,000
8.	Complete site final cover	25 ac	$58,000/ac	$1,450,000
		Subtotal (rounded)		$2,946,000
		Mobilization, demobilization and site services (10%)		$ 295,000
		Subtotal		$3,241,000
		Contractor's Fee (16%)		$ 519,000
		Subtotal		$3,760,000
		Contingency (15%)		$ 564,000
		TOTAL		$4,324,000

Post Closure Cost Estimate - Alt 6 (Off-Site Disposal)

	Description	Annual Quantity	Unit Cost ($)	Annual Cost ($)
1.	Inspect the site	1 crew day	$500/crew day	$ 500
2.	Maintain the vegetated cover	5 crew day	$600/crew day	$ 3,000
		Subtotal		$ 3,500
		Contingency (20%)		$ 700
		TOTAL Annual Cost		$ 4,200
		TOTAL Present-Worth Cost*		$49,000

* Present-worth cost is computed over 30 years @ 7 3/8% discount rate; present-worth factor = 11.7